Mapping Peoples' Forests:
The Role of Mapping in Planning Community-Based Management of Conservation Areas in Indonesia

Cristina Eghenter

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Table Of Contents

List of Figures

Foreword

In the six years since PeFoR was initiated, our outreach strategy has focused on networking, apprenticeships, and the sharing of information amongst indigenous groups and the agencies that support or are otherwise involved in activities in their territories. As more organizations are turning to mapping technologies to achieve their goals, we hope that the sharing of lessons and issues will help new users of mapping technologies to avoid relearning the same lessons and move everyone forward.

This PeFoR discussion paper, by Cristina Eghenter, focuses on a conservation organization's involvement in mapping indigenous lands for the purposes of creating protected area borders and management plans. Dr. Eghenter reviews WWF-Indonesia's mapping experiences associated with protected areas in three places: Kayan Mentarang National Park in East Kalimantan on the island of Borneo; Lorentz National Park in Irian Jaya (Papua)[1] on the island of New Guinea; and several small reserves in the province of Nusa Tenggara on the islands of Timor, Lombok and Sumba. Most of her direct experience and insights are derived from her work in Kayan Mentarang. Readers who are interested in understanding more about WWF's Kayan Mentarang project can find additional details in Colchester and Erni (1999).

Dr. Eghenter offers questions and issues for readers' consideration. Instead of providing simple answers, she hopes to encourage debate and more open sharing of experiences. While she discusses the virtues of community-based mapping, her paper brings home the lesson that mapping isn't a simple process of technically-defined steps. Mapping entails making decisions and drawing lines that entangle the multiple strands arising from the land's history and the current interests claiming rights to the land's future. Within a community, or between communities, the historical strands supporting borders and rights are made visible in stories and conversations, and a claim's legitimacy is judged locally by one's peers. When the mapping process is controlled by an outside interest group, there are issues about whether the mapping implementers can equate "participation" with fully informed consent to a permanent line on a map that will endure over time and be judged by distant polities disjunct from local history.

From the conservation perspective, she highlights a core issue related to the delineation and management of protected areas -- the conflict between the prior rights of local people and the recent claims of rights over the same territory. She also asks how conservation organizations can use mapping to create clear borders and rules for protected areas in the context of national policies that ignore the conflicting claims of concessions, protected areas and indigenous communities, and in the face of government's failure to enforce regulations and laws against illegal extraction operations.

The paper leads the reader to ponder whether conservation organizations are fully aware of the power of the community mapping that they are supporting -- rather like the sorcerer's apprentice who enchants a broom so his work will be easier and is then dismayed to discover that the broom has taken on a life of its own. She encourages conservation organizations to realize that they may be sowing seeds to undermine their own agenda if they do not explicitly include scientific information and biological concerns during community-based mapping for zoning,

[1] The province of Irian Jaya was officially renamed Papua in 1999.

managing or delineating protected areas. The integration of biological data on the local maps would clarify the conservation organization's objectives in the minds of the community members who are otherwise left expecting that the land use information in their maps will alone determine the zonation and boundaries of the protected area.

From the social equity perspective, she asks whether maps produced by conservation organizations will benefit indigenous communities and, if so, will they only benefit the leaders of those communities. While mapping can empower communities to resolve conflicts and build consensus about community goals and plans, the empowerment objective can only be achieved through a strategy that uses tools beyond mapping. Dr. Eghenter notes that "participatory" PRA-type mapping can gloss over intracommunity conflicts and thereby lead conservation organization teams to draw lines that will create rather than resolve local conflicts.

Dr. Eghenter concludes that mapping should not be viewed as a quick fix for the multiple social issues integrally related to protected area planning and management. Mapping cannot substitute for a conservation organization's attention to nurturing conflict resolution mechanisms and democratic political processes in the polity living in and around a Protected Area. Mapping may create a false sense of ecological security if the shared aims of the local polity and the conservation organization conflict with mining, logging, reforestation, oil palm estates, and other activities of more powerful interest groups. Maps can be a helpful tool for clarifying these conflicts, but maps are insufficient for resolving them.

Other PeFoR lessons are being disseminated in books. The Center for the Support of Native Lands is producing a review of methods and lessons from mapping projects in Honduras, Nicaragua, Panama, Bolivia, Surinam and Cameroon (Chapin and Threlkeld 2000). A book from the Legal Rights and Natural Resources Center (Bennagen and Royo 2000) explores insights and issues raised during mapping projects in Philippines. And WWF-US recently published case studies, lessons learned and recommendations derived from a review of WWF's decade of experience in working with Indigenous Peoples (Weber et al. 2000). Finally PeFoR is conducting a review of the Indigenous Peoples and biodiversity sector, with recommendations for donors, to be published later this year.

—Janis B. Alcorn
Director, PeFoR

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1. Local People and Conservation Areas

Since the early 1980s, in conservation and protected areas management circles, there has been an increasing emphasis on: (a) the participation of local people in the management of conservation areas and (b) the need to balance conservation priorities with the development needs of the communities living in and around the conservation area. Evidence from anthropological, human ecological, and archaeological studies had shown that local people in certain cases had played an important role in the preservation of specific environments and that human-induced disturbances had been part of the natural landscape as we know it (Headland 1997; Sponsel et al. 1996). Moreover, local people were, for the most part, economically dependent on the natural resources of the conservation area.

While it was becoming apparent that communities could have an important role in the management of conservation areas, it was also clear that the differing protection priorities of natural resources and economic development could cause conflicts between protected areas and local people (Wells and Brandon 1992). Under these circumstances, the viability of conservation efforts became contingent upon the inclusion, rather than the exclusion, of local people. Moreover, the recognition of the rightfulness of local peoples' claims to the land, based on a long history of settlement in the protected area, discredited initiatives of strict enforcement of protection measures such as denying access to the exploitation of natural resources. The regulation and limitation of their use for conservation purposes required instead that alternative and compensatory means of livelihood be provided outside the protected areas in buffer zones.

In response to these challenges, conservation specialists started to plan new initiatives designed to involve local communities and link efforts to conserve biodiversity with the creation of economic incentives to promote a sustainable use of natural resources. Community-based management and Integrated Conservation and Development Projects (ICDPs) exemplify the new approach. It is assumed that local communities have a greater interest and greater accountability in the sustainable management of resources over time than the state or other distant stakeholders. It is believed that local people, precisely because of their long-term residence in the area, possess a wealth of knowledge about the local natural environment and ecological processes, and that they are more able to effectively manage those resources through local management strategies and traditional forms of access (Brosius et al. 1998). Participation of local people and adoption of local management practices are seen as essential for the achievement of a conservation program that is biologically, socially, and economically sustainable.

Participatory Rural Appraisal (PRA) has become the methodological process of choice among practitioners engaged in collecting and organizing the information necessary to implement conservation and management strategies that can accommodate both conservation and sustainable development concerns, and local people's rights. PRA comprises a set of approaches and techniques designed to be participatory, relevant, flexible, rapid and low cost, and empowering (Momberg et al. 1993). Participatory means that local people are involved in the process as subjects rather than objects of research. The techniques become relevant as they cater to the ability and needs of local people in order to reconcile these with the priorities of the project. The process is flexible, since the multiple tools developed allow for easiness of use, variety, and adjustment to specific circumstances. Contrary to most traditional, long-term research, the implementation of PRA techniques is rapid and low cost, which better suits the time and budget constraints of most projects. PRA is predicated upon the principles of building local

capacity and consensus building by facilitating the exchange of information and making it accessible and relevant to all stakeholders and decision-makers. PRA can thus be empowering for local communities that, by means of this process, acquire visibility as political entities and gain the necessary confidence to enter negotiations with outsiders.

Community mapping is a common tool of the PRA repertoire now widely used by local communities and the nongovernmental organizations working with them to map local management and use of resources, and indigenous claims to customary lands.

1.1 Official maps and the "empty" forests of Indonesia

The implementation of community mapping in the Indonesian social and political context has acquired special significance. Since the early 1970s, the Indonesian government has produced maps to plan the development and exploitation of vast forest areas. The initial forest maps were drawn to allocate access rights to timber concessionaires (HPH). These maps were replaced in the early 1980s by the maps of the Consensus Forest Land Use Plan (*Tata Guna Hutan Kesepakatan* or *TGHK*) developed by the Department of Forestry together with the provincial bureaus for agricultural and public works affairs. Categories of forest status were solely based on topographical criteria such as soil inclination and potential for soil erosion. The categories included: nature reserve (*cagar alam* or *CA*); protection forest (*hutan lindung* or *HL*); limited production forest (*hutan pemanfaatan terbatas* or *HPT*); production forest (*hutan produksi* or *HP*); conversion forest (*hutan konversi* or *HK*); and unclassified land. These maps, however, had been drawn on "empty" charts with little or no consideration of already existing claims to the area, in particular those of local communities that had been living off that land for several generations (Peluso 1995). Maps of such imprecision often illustrated forested territories as wild and uninhabited, officially non-settled and therefore ready for exploitation. The boundaries of conservation areas as well as those of timber concessions were settled prior to any consultation with local communities living in or near the area. Most recent official mapping efforts, the RePPProt project, combined Landsat data and aerial photography to map actual land use cover and forest types according to canopy appearance. Both shifting and settled cultivation appeared on the maps, but the 1:250,000 scale could not show boundaries of customary lands claimed by indigenous communities (Moniaga 1993).

While, according to the Indonesian Department of Forestry policies, the concessionaires are obliged to recognize the existence of customary land and reach a consensus with the villagers about management, the latter for the most part have been denied rights of access and use of resources within a concession. Similarly, the legislation with regard to national parks still provides no strong mandate for community participation in the planning and management of protected areas. Legal and social practices of this kind have resulted in the disfranchisement of peoples living in forests and other "wild" environments by denying their very existence and their claims over natural resources. The spaces claimed as "empty," standing at the margins of development and potential sources of social troubles but rich in natural resources, could thus be controlled and exploited by others.

Outside the realm of forestry policy, it is also important to note that opportunities for using community mapping in Indonesia are guaranteed through the 1992 legislative Act that supports the process of regional spatial planning (WWF-Nusa Tenggara Project 1997). The Act

entrusts the active participation of local people in identifying priorities in needs and land use planning.

1.2 Countermapping: mapping by local people

In recent years, community mapping has constituted an alternative to the authoritative mapping by government agencies and provided a "countermapping" strategy in Indonesia (Peluso 1995). Mapping enables communities to draw detailed maps of their lands and resource use which are not acknowledged in the imprecise and "empty" official maps. The process allows local people to document and formalize claims to forest resources by countering (and invalidating) the mapping that has historically represented the political and economic interests of governments, industry, and local elites.

Community mapping is a method for mapping customary land use. It produces information on how local people view and manage their territory and the resources within. It shows the kinds of constraints and threats to traditional practices. Maps are not neutral. They visually depict social and power relations with regard to the control and exploitation of natural resources (Peluso 1995) as well as legitimize claims. GIS software and GPS equipment have made it possible for indigenous organizations and local communities to compile the information on their lands with the kind of precision and sophistication demanded by governments and international organizations (Rocheleau and Edmunds 1997). Maps help communicate this information to outsiders and, by doing this, become a powerful medium of negotiation with government agencies over community forest access and use rights (Thorburn 1994).

This paper will review case studies of community mapping in three conservation projects of WWF-Indonesia: Kayan Mentarang National Park (East Kalimantan), Lorentz National Park (Irian Jaya); and various conservation areas in Nusa Tenggara (West Timor, Lombok, Sumba). Particular attention will be paid to the Kayan Mentarang case because of the long history of design and implementation of its community mapping program, which opened the way to other, similar experiments in other projects of WWF-Indonesia. All three projects received funding to support training and implementation of community mapping from the Biodiversity Support Program's Peoples, Forests and Reefs (PeFoR) project. The review of these case studies provides a significant and much needed illustration of how and why particular kinds of mapping strategies were used in the context of community-based management (Brosius et al. 1998). It also examines how these strategies relate to (and survive) the challenges of biodiversity conservation, legitimization of customary land claims, economic development, and sustainable use of forest resources.

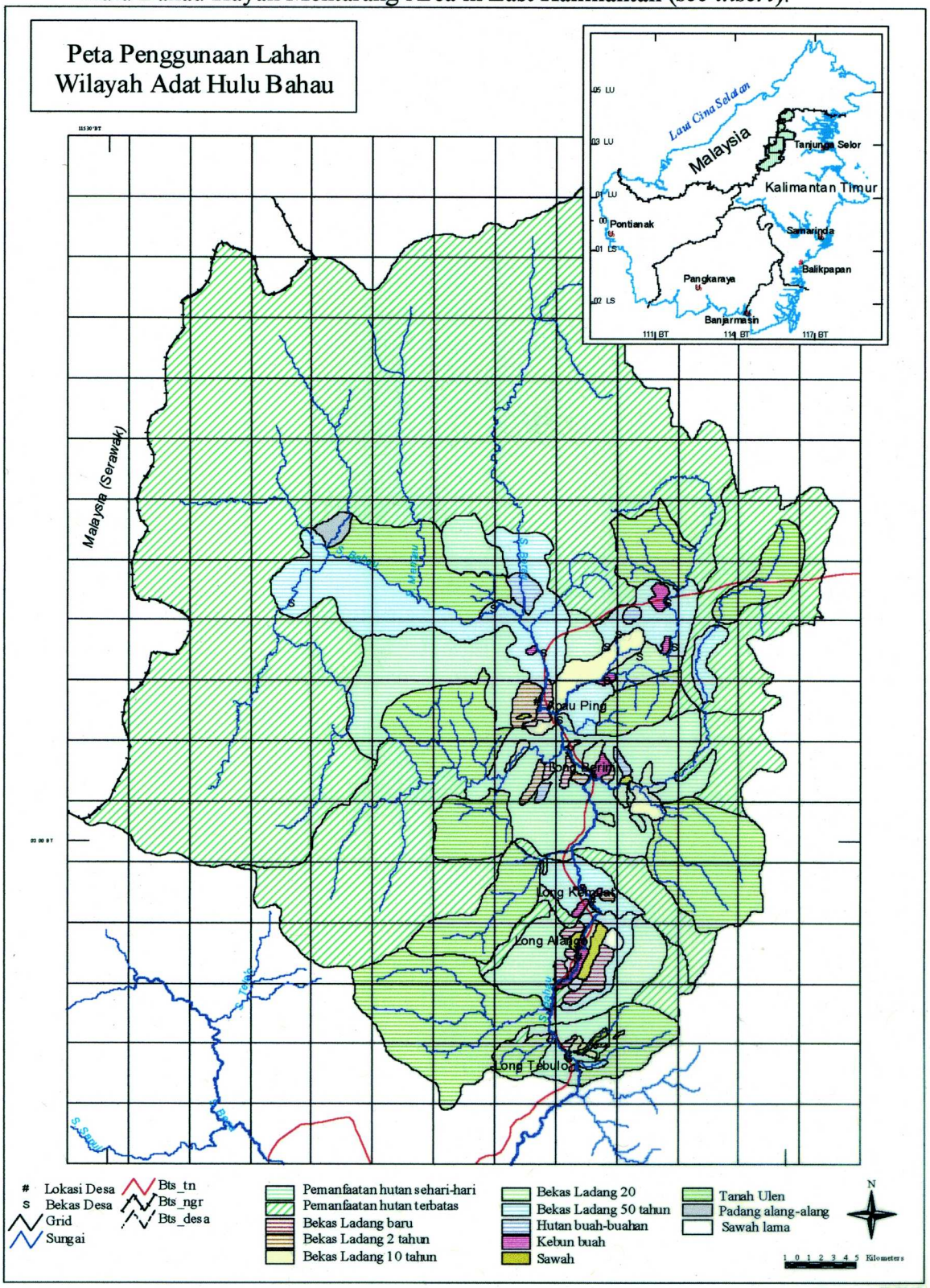
2. Community Mapping in Kayan Mentarang, Nusa Tenggara, and Irian Jaya by WWF-Indonesia

Similar expectations underlie the design and implementation of community mapping in all three projects of WWF-Indonesia. Some aspects, and occasionally the focus, varied depending on the specific problems and challenges of each conservation area. In general, it can be said that community mapping was used to:

- assess the spatial interactions between communities and resources in a protected area;
- document customary rights of local communities with regard to natural resources;
- identify and resolve boundaries disputes between different stakeholders;
- facilitate community participation in the management of conservation areas;
- increase local capacity;
- facilitate land use planning inside and outside the conservation area.

The Kayan Mentarang conservation project conducted the first pilot project in community mapping in 1992, in connection with the growing openness of policy makers toward integrating traditional forest management practices into national-level forest management plans. The project focused on "the location and nature of forest-tenure boundaries ... and indigenous ways to organize and use space, and how these might conflict with or support forest protection" (Sirait et al. 1994: 411). It was expected that, if successful, the method for mapping customary land use systems could be officially recognized and used by the Indonesian Department of Forestry. A few years later, community mapping was used to provide evidence for changing the status of the Kayan Mentarang conservation area from a strict nature reserve to a national park where the land rights and resource management of local inhabitants could be recognized and accommodated. The outcome of previous research had indicated that the co-incidence and co-dependence of people and forests in this part of the interior of Kalimantan required that conservation efforts be based on the recognition of the importance of the human as well as natural components of the environment (Eghenter and Sellato 1999; Dove and Nugroho 1994). Evidence seemed to indicate that local management of forest resources was generally sustainable under stable conditions. On the contrary, the implementation of a strict nature reserve with exclusion of all human use would have alienated the support of local communities for any conservation plan. In the last and most intensive phase of implementation of community mapping, 1997-1998, the team completed the mapping of all customary lands in the national park area (Figure 1). The maps were to be used to make recommendations by the communities and the project for external boundaries and internal zonation of the national park. They were also expected to provide the basis for acknowledgment of *wilayah adat* (customary lands) by the government in a process that would recognize the role of local people in planning the development of the region.

FIGURE 1: Illustrative example of a *wilayah adat* (customary land) map from the Hulu Bahau Kayan Mentarang Area in East Kalimantan (*see insert*).



Source: WWF Indonesia

Legend Translation:

Lokasi Desa – Village location
Bekas Desa – Former village
Grid – Grid
Sungai – River

Bts_tn – National Park boundary
Bts_ngr – National Border
Bts_desa – Village Boundary

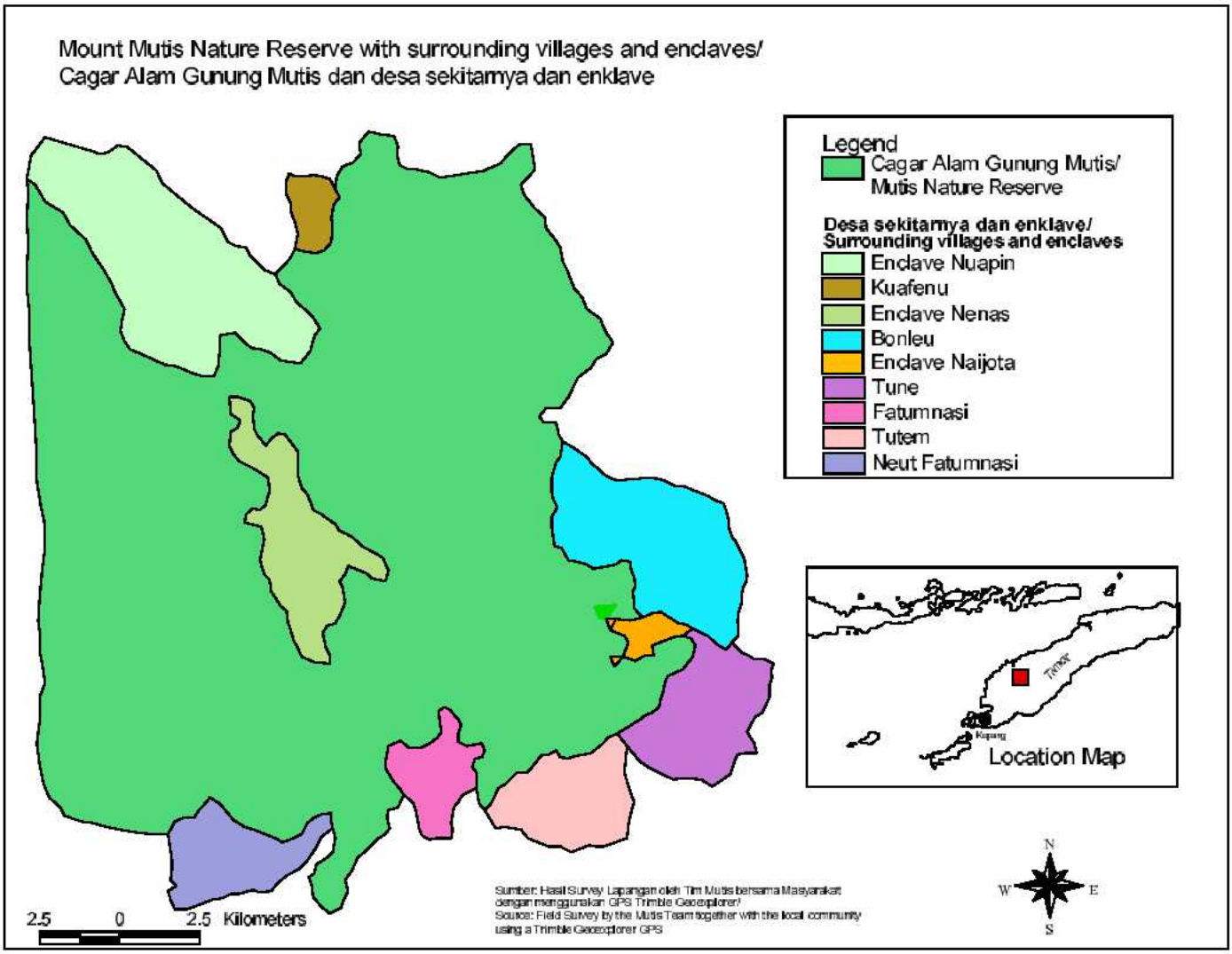
Pemanfaatan hutan sehari-hari – Daily use forest
Pemanfaatan hutan terbatas – Limited use forest
Bekas Ladang baru – Recently fallowed fields
Bekas Ladang 2 tahun – Fallow fields 2 yrs
Bekas Ladang 10 tahun – Fallow fields 10 yrs

Bekas Ladang 20 – Fallow Fields 20 yrs
Bekas Ladang 50 – Fallow Fields 50 yrs
Hutan buah-buahan – Diverse fruit forests
Kebun buah – Fruit garden
Sawah –Rice

Tanah Ulen – Protected Forest
Padang alang-alang – *Alang-alang* field
Sawah lama – Old rice fields

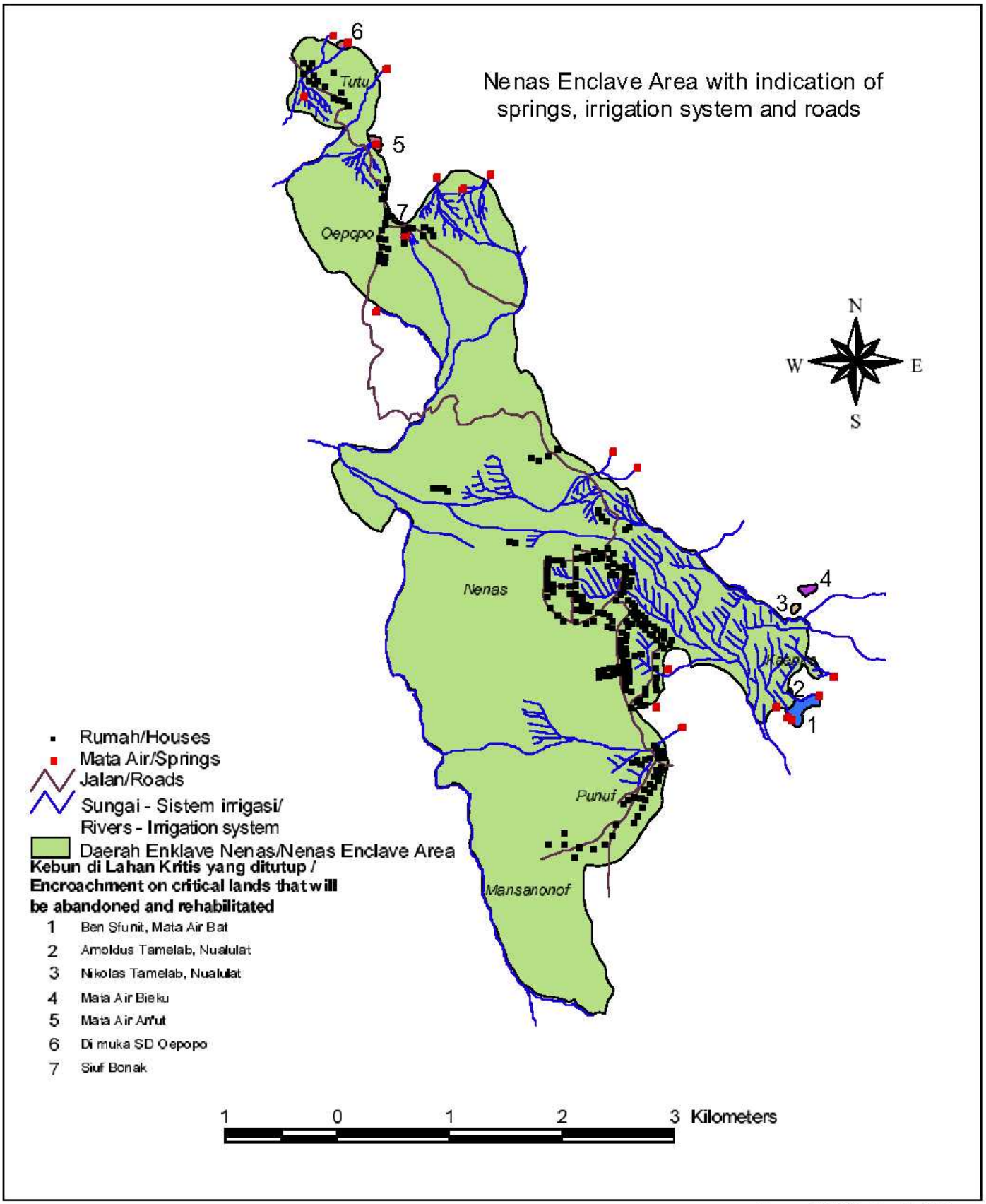
In the Nusa Tenggara project, the beginnings of community mapping by WWF were tied to a broadly based initiative for the development of the area known as the Nusa Tenggara Uplands Community Development Consortium (NTUDC). The consortium, a loosely linked network of representatives of four NGOs, government, universities and communities, has been working on the development of strategies for conservation and community-based natural resource management through the Conservation Working Group (CWG). WWF sought their collaboration to encourage local peoples' participation in conservation management through environmental awareness, participatory land use planning, and boundary delineation. Community mapping was one tool used in several protected areas including: the nature reserve of Gunung Mutis, West Timor (Figures 2 and 3); Gunung Rinjani, Lombok; and Wanggameti, Sumba. Mapping was used to enable local communities' participation in planning integrated land use and natural resource management; rationalize unclear and disputed boundaries; and find a solution to agricultural encroachment in conservation areas (WWF-Nusa Tenggara Project 1997).

FIGURE 2: Map of Gunung Mutis Nature Reserve, West Timor.



Source: WWF Indonesia 1998

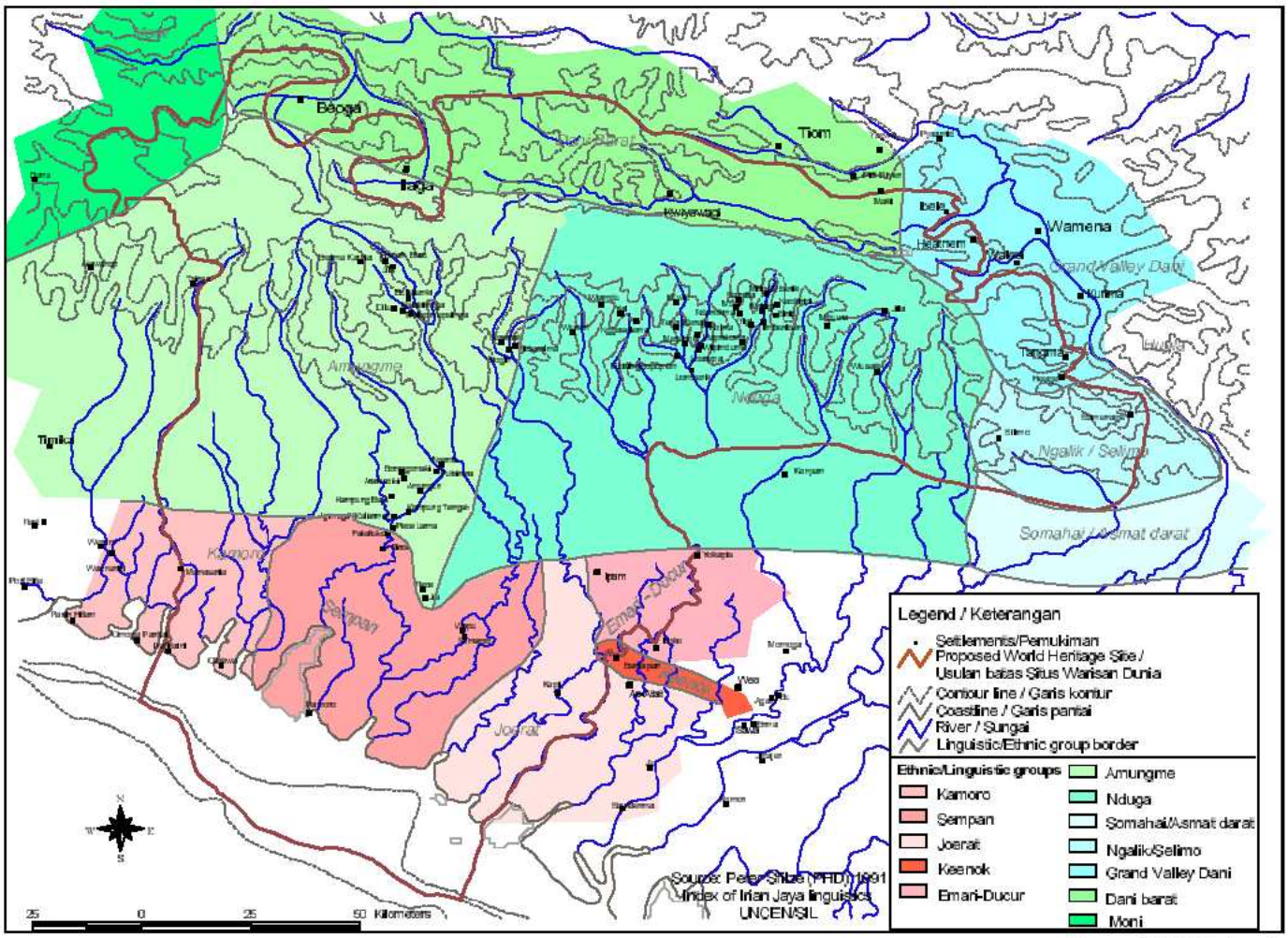
FIGURE 3: Enclave within Gunung Mutis Nature Reserve.



Source: WWF Indonesia 1998

In Irian Jaya, WWF has used mapping in several projects to facilitate conflict resolution and participatory boundary delineation. A Memorandum of Understanding was drafted between WWF, local NGO partners, and provincial government to acknowledge community mapping as a tool for spatial planning in buffer zone areas. In the Lorentz National Park (Figure 4), the level of security risks and conflict in the western and central parts of the park prevented WWF and local communities from conducting community mapping inside the park boundaries. Efforts have therefore concentrated on the Asmat land and Baliem valley located along the eastern boundary of the park. The expectation is that community mapping can play a role in helping negotiations between concessionaires and local people and in mitigating the threats to the conservation area caused by mining operations (Figure 7), mineral prospecting, illegal logging, and illegal fisheries.

FIGURE 4: Map showing overlap of Asmat, Dani and other peoples' territories with the Lorentz National Park and World Heritage Site.



Source: WWF Indonesia

2.1 The development of WWF's community mapping methodologies

The three WWF projects reviewed in this paper are at different stages in their histories of implementation. WWF first experimented with community mapping in Kayan Mentarang in 1992, and the methodology subsequently went through a long phase of revisions and adjustments. Community mapping activities have been conducted in Irian Jaya and Nusa Tenggara since 1996. The methods and approaches used in Kayan Mentarang were summarized in field manuals by Dolvina Damus et al. (1996), and Momberg et al. (1996), and further described by Momberg and Van Noord (1998).

Methodological choices depended on the objectives that were to be pursued. Despite occasional lack of clarity on the objectives of community mapping, and unstated agendas on the part of stakeholders, for the most part the approaches closely reflect the purpose and intended use of the maps.

As community maps seek both official acknowledgment of the rights of local people and clear delineation of boundaries of protected areas, the information needs to be geo-referenced to official topographic maps. Base maps 1:50,000 were prepared with the help of reference maps such as radar maps 1:50,000 (the most accurate but difficult to interpret), satellite images where available (the cost of these maps remains very high), and 1:100,000 Bappeda (Regional Planning Board) maps based on the interpretation of the same radar maps. Before the mapping exercise, base maps were further improved in the field by cross-checking with local informants for names of rivers, mountains, and old sites. A Global Positioning System (GPS) was used to determine the spatial locations of all major river confluences and to geocode all important features in the community maps in order to upgrade the accuracy of sketch maps.

A Geographic Information System (GIS) can help store, manage, and analyze spatial information obtained from village mapping. This opportunity, however, is available only to organizations and groups with substantial financial resources that can in turn provide training and GIS services for others. ARC/INFO, especially ArcView, was the preferred software in all three projects. It is also the software that most government and international agencies use in Indonesia.

Steps in the implementation of community mapping

In general, a preliminary visit is held during which the staff discuss the scope of community mapping with local people and decide the time and location of the exercise. The decision to conduct community mapping is sometimes the result of the initiative of the communities themselves. The drawing of the maps is preceded by a theoretical explanation about mapping as projection onto a two-dimensional space, including a discussion of topography, scale, and map legend. Although useful, the theoretical part has sometimes proved too difficult and abstract for village audiences. In some cases, like in Nusa Tenggara, sketch maps were drawn first and the scale determined later during the re-drawing of the maps. In Kayan Mentarang, the information collected in the field was directly entered onto 1:50,000 base maps that were later digitized.

For the purpose of training and implementation, participants have been divided in three groups that vary in terms of gender and/or age perspectives: adult women, adult men, and mixed

youth group. Members of each group contribute information on land use and location of natural resources on a separate map. The maps provide a sense of location and encourage local people to view community problems and opportunities from a spatial perspective. Each group's maps show boundaries, infrastructure, watersheds, rivers, land use systems, gathering and hunting areas, village forest reserves, graveyards and other sacred places.

Afterwards, each group walks a transect to survey a segment of the territory and document land use, species composition and dominant type of vegetation, ownership status and conflicting claims, soil types and management problems. Transects are useful cross-sections for distinguishing major zones of land use and learning about indigenous ecological categories.

It is important to note that this process of drawing community maps often reveals cognitive variations based on gender and age. Women's maps, for example, focus on mapping resources in areas close to the villages which represent their main sphere of interaction with the environment. They provide the most information on location of bamboo, vegetables, medicinal plants, and other resources frequently controlled and used by women. Women also tend to be very concerned with protecting drinking water and collection areas for firewood. Men, instead, can draw reliable and detailed maps of the main areas for collection of commercial forest products, succession of fallows, and hunting areas. Traditional forest reserves instituted in the past still figure in the maps of adults and elders, but not on those of younger people.

Additional PRA and other data collection techniques were used in the three projects to complement the maps. The data sought varied depending on the relevance of mapping objectives and needs in the local context. In Kayan Mentarang, initiatives of community mapping were stimulated by long-term interdisciplinary research conducted under the auspices of WWF's Culture and Conservation program (Eghenter 1999; Eghenter and Sellato 1999). The research output helped corroborate, adjust, and contextualize the information collected by means of PRA techniques. Local regulations regarding the management of land and other natural resources were collected. The technique of Venn diagrams was also used to map local institutions with regard to the perceived influence of each institution in the life of the community.

In several locations of the Nusa Tenggara project, staff involved in community mapping also collected detailed census data of animals and population in disputed enclaves. The information was important in trying to evaluate the exact extent of agricultural encroachment and find a solution to the problem. To this end, the staff also documented *adat* (customary law) in relation to management and ownership of resources in the area since Dutch times (Lentz et al. 1997).

In Lorentz National Park, mapping activities were only recently started and for the most part focused on the delineation of land use and landscape zonation according to local ecological categories. For this purpose, sketch maps combined with GPS and GIS technology are adequate tools.

A general consensus-reaching *(musyawarah)* meeting concludes all mapping activities. At the meeting, the results of each group are presented, discussed, and combined into one common map and document. Community representatives are also encouraged to evaluate the activities and make recommendations. In Kayan Mentarang, the process was particularly complex. After the drawing of village maps, these were combined into a *wilayah adat* (customary land) map signed by all village leaders and the customary leader at a *musyawarah*

adat meeting. The final results were then presented to the chief official and staff of the local sub-district *(kecamatan)* for their approval. The lengthy process was thought to guarantee a better integration between the aspirations and claims of the local communities and the development plans of the government, particularly in anticipation of the official recognition of the *wilayah adat* and local peoples' rights to access and use the forest.

Methodological choices in Kayan Mentarang

In the course of the history of the Kayan Mentarang project, the methodology of community mapping underwent several evaluations and fine-tuning following the changes in the objectives of mapping activities. Community mapping was re-examined in terms of its contribution in the context of an integrated community development and conservation project. While its constitutive and basic elements stayed the same (land use and natural resource maps, transects, collection of oral histories and customary regulations), other exercises were modified or added in order to strengthen the information of the maps for the future management of the conservation area. In 1997, community mapping was made part of a more articulated program of community development focusing on local capacity building and analysis of sustainable economic options. The new strategy required that a joint training workshop for trainers be held and the results of community mapping be presented at the district (*kabupaten*) level to get official acknowledgment of the maps.

In the view of the project, it was crucial that the maps produced be supported by all the relevant government agencies as well as local communities, and the results be formally recognized. The implementation phase also shifted focus from mapping the village territory as such to mapping the village as part of customary land. The latter constitutes the significant social and political unit in the life of the communities in and around the Kayan Mentarang National Park.

It became evident that the analysis of local institutions needed special consideration in light of the expected role of local communities in the co-management of the conservation area. As such, the analysis needed to be developed into an independent component instead of a collateral exercise of the mapping effort. A new method was developed and tested before it was brought up for evaluation at the training workshop. In addition to the Venn diagram technique, the participatory inventory of local institutions include analysis of stakes and interests in the local management of natural resources; analysis of difficulties and problems experienced by local institutions, both formal and informal ones; and possible steps that could be taken for overcoming such difficulties. If the analysis of local institutions could now be considered an independent component of community development implementation, the results needed to be assessed in conjunction with the outcome of community mapping. For example, the documentation of customary regulations with regard to the exploitation of natural resources could find a more appropriate framework of interpretation within a more comprehensive analysis of local institutions than if customary regulations were viewed only in the context of a land use map.

Participatory planning for village development had been the weakest component of the community mapping activities. It lacked a rigorous economic evaluation of potential and market analysis, and relied far too often on a rather impressionistic view of economic opportunities for village development. Granted that a PRA approach could not necessarily provide the kind of in-depth and quantitative analysis required, the component was still too rudimentary in its

formulation to provide a basis for further assessment of the conditions and potential for economic development. In addition, it was unclear to what extent a rather vaguely defined "village development" could be accommodated within the objectives of the Kayan Mentarang project and the development of a management plan for the National Park. In light of these concerns, some of the staff of the Community Development team designed and developed a basic participatory inventory for economic potential. The exercise was tested in one customary land of the National Park area before it was collectively evaluated at the training. The focus of the exercise is a qualitative estimate of availability and exploitation rates of natural resources by the community, and a preliminary analysis of economic potential and needs by local people based on criteria such as time, production cost, and access to market. Similarly to the new inventory of local institutions, the results of this exercise both strengthened and complemented the outcome of community mapping.

2.2 The importance of training

In all three projects, the training of local people, NGO staff, and local government officials was emphasized. The involvement of local people was seen as a way to encourage and empower local people with regard to their role in the management of conservation areas. The participation and support of local government was also regarded as essential. Because maps clarify boundaries, including those of parks, villages, and forest concessions, all relevant government parties should be as much as possible part of the process.

In 1995, after an intense, field-oriented phase, the community mapping team of the Kayan Mentarang project entered a period of reflection and internal discussion during which they put together a manual for participatory community mapping. A manual was completed in March 1996 (Damus et al. 1996; Momberg et al. 1996). The manual was part of the plan to make training of community representatives and local government officials the main focus of the community mapping program. The manual reflects a new concern with building institutional support for the maps and outlines an approach designed to build consensus among all stakeholders.

The production of the manual was a concrete step in the direction of building local capacity. The transfer of expertise from the project staff to community representatives was expected to encourage the participation of local people in the management of the conservation area and the development of the communities. Moreover, the successful transfer of mapping skills and techniques would increase the ability of local people to control, manage, and monitor the information contained in the maps to prevent misuse of that information for the economic benefit of a few individuals and/or outside companies.

Specific training workshops and sessions prior to activities in the field were organized in Kayan Mentarang, Nusa Tenggara, and Irian Jaya. The main objectives were to:

- learn how to involve local people and encourage participation in these and other activities;
- train village facilitators and build local capacity;
- train in GPS, GIS, sketch mapping and other methods that communities could use to negotiate and strengthen their claims to traditional lands, settle border disputes, and plan future management of natural resources in their territories;
- encourage participation and coordination among different stakeholders.

In Irian Jaya, two mapping training workshops were conducted in the bufferzone of Lorentz National Park in March-April 1997. The workshop in the highlands was joined by representatives of villages, the Department of Nature Conservation Sub-Balai KSDA, Bappeda, and local NGOs. In the lowlands, the workshop was joined by representatives of villages, government agencies, NGOs, and development workers of the local Catholic mission active in community development. The enthusiastic participation helped develop significant collaboration between WWF and Bappeda. The latter agreed to incorporate community maps into the official spatial plans for the villages and districts.

In Nusa Tenggara, the efforts to develop training opportunities into a means to shape interdisciplinary vision and encourage cooperation among all stakeholders were successful despite the challenges of different backgrounds and attitudes. Facilitators from WWF and the Upland Development Consortium held training workshops in conflict resolution, community-based conservation and sustainable development in boundary villages of eight protected areas on the islands of Timor, Flores, Sumba, Sumbawa, and Lombok. Participants representing all major stakeholders identified long-term strategies for managing conservation areas through collaborative research.

In East Kalimantan, the training took place in each sub-district *(kecamatan)* of the Kayan Mentarang National Park and involved local government staff. Despite numerous socialization efforts, the program failed to guarantee the participation and training of officials at the sub-district *(kecamatan)* level. As a result, the main targets and counterparts of the project remained the communities. While this helped build an enduring bond with local people, it also jeopardized the possibility of a stronger support and interest on the part of the district government towards this and other activities of the project.

The identification of relevant stakeholders in the process of community mapping is not always easy. Sometimes important actors at the local level were excluded. The prevailing approach was based on the involvement of a basic triad of NGOs, community representatives, and government officials. It is, however, dangerous to assign a false sense of homogeneity and internal consensus to any of the three stakeholders and assume them as unproblematic. For example, in the context of a long history of migration and resettlements in the Kayan Mentarang area, who become the "local communities" that can rightfully document and lay claims on a particular territory? Who should be invited to attend the training in community mapping without determining a priori specific entitlements? This issue prompted the decision to include representatives of "outmigrants" (people who had left the area years or decades before) at community mapping activities. But this decision increased the risk of excluding others.

The false sense of homogeneity is clear in Nusa Tenggara where representatives of the "government" expressed different expectations. Agencies like the Forest Service and the Animal Husbandry Service made contrasting recommendations for the management of the Mutis Reserve (Lentz et al. 1997).

2.3 Risks of methodological involution

The empowering potential of training workshops was, however, limited by the risks of "methodological involution" of community mapping. This was particularly true in a project like Kayan Mentarang in the aftermath of the adoption of the training and implementation manual. The manual was becoming the exclusive reference for how things should be implemented. The alleged flexibility of field techniques decreased vis-à-vis the need to be consistent with the procedures put forth in the manual. In a way, the manual guaranteed standardization and accuracy in the production of maps. Yet, the adherence to a rather unqualified principle that all techniques and approach have to be participatory, i.e., chosen and/or decided by each community at the time of the implementation of community mapping, resulted in maps that were unique rather than typical. The maps could hardly be compared with other maps from a different area or easily interpreted by outsiders. Colors and categories used in the legend differed, and classificatory terms were often provided exclusively in the local language. The degree of details shown on the maps was also not the same thus, hampering a uniform reading of traditional land use over the entire conservation area.

The illusion of multiple and all-inclusive maps

The findings of Rocheleau and Edmunds (1997) show the importance of the inclusion of a gender-based analysis. Such gender-based mapping is essential to preserve local biodiversity, since men and women can have different uses and concerns with regard to natural resources. A similar motivation was behind the idea of a women's group and a women's map in community mapping. But the strong emphasis on creating consensus and one map that accommodates all users can sometimes conceal the multiplicity of perspectives and knowledge on the use, value, and meaning of specific environments as experienced by groups of different gender, age or social class. Moreover, it can ignore internal tensions and divisions (Gatmaytan 2000). The emphasis on consensus can be understood in the Indonesian political context of still uneven acknowledgment of customary rights. An image of unity at community level can enhance the political chances of success. This, however, should occur without losing sight of the differences among users in a shared environment. It is ultimately the differences evidenced in the maps that can tell us about the expectations of each group and help us identify appropriate directions for community development and management of resources in the future.

Two-dimensional maps may be limited in their ability to reflect the complexity of land tenure systems and use rights, or delineate what Rocheleau and Edmunds (1997) call "boundaries of nested bundles of rights and management." However, the challenge is not so much conceiving all-inclusive maps but strengthening the authority of maps on the basis of the results of other methods and discussions with local communities.

3. The Achievements of Community Mapping

The expectations associated with the implementation of community mapping concern three main interrelated beliefs: (1) community mapping is a tool for better management of conservation areas; (2) it helps build local capacity; and (3) it can be used to resolve boundary disputes. Despite the fact that the full pursuit of all three objectives may prove in practice untenable, a review must go beyond the evaluation of intents or stated principles and assess whether the expectations have, and to what extent, been fulfilled.

3.1 Community mapping and better management of resources

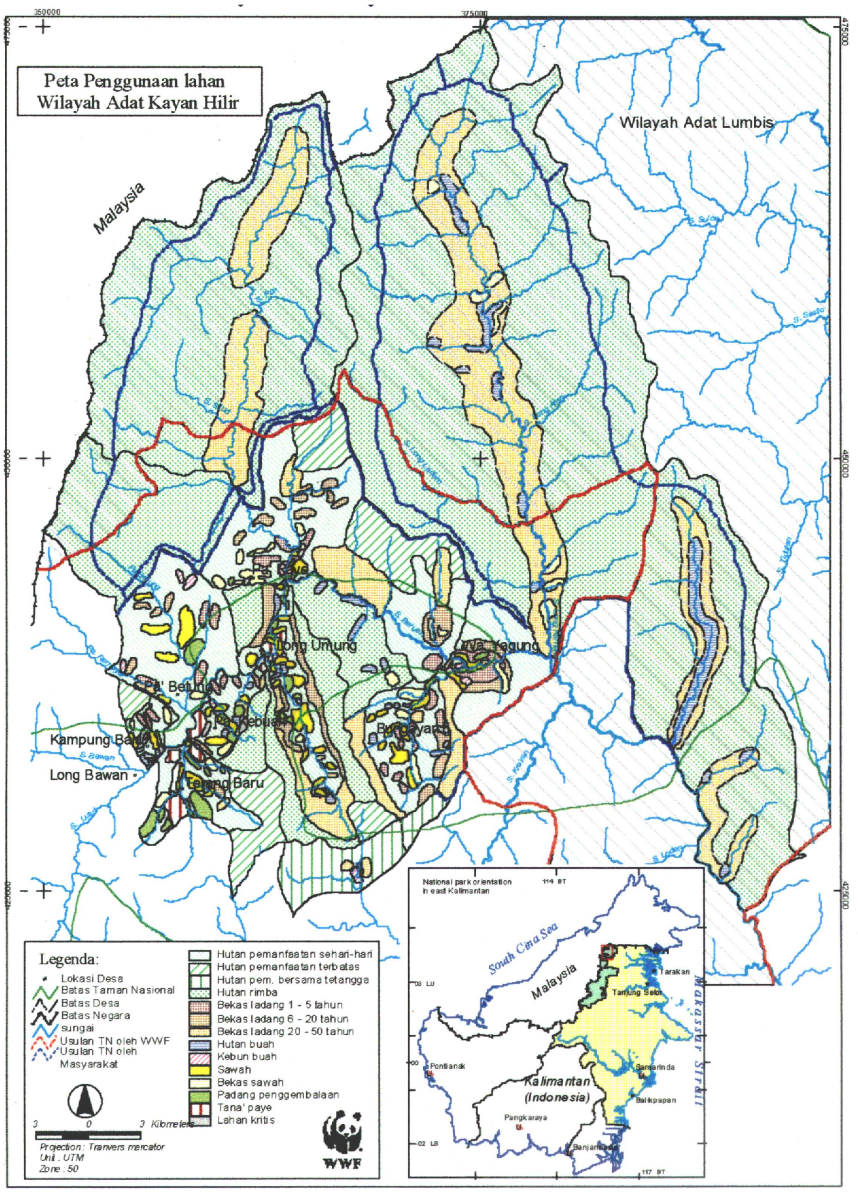
Did community mapping result in better management of natural resources or support planning for better management? In many ways, community maps do not offer ready solutions. The assumption sometimes made, that the recognition of maps would allow a de facto recognition of people's customary rights (Peluso 1995), ignores the difficult process of negotiation and decision-making which takes place after the mapping process. Maps are important in that they help identify present and future key problems in the management of conservation areas. The combination of community mapping and other exercises makes it possible to bring together local people and concerned government agencies to find a reasonable and fair solution.

In the Gunung Mutis Nature Reserve, Nusa Tenggara, local people used the results of community mapping to recommend a revision to the current boundaries of the reserve. They proposed a land swap whereby an important agricultural area that had been cultivated by local people since the early 1940s would be taken out of Nature Reserve and, in exchange, a forest surrounding the village water source would be added to the Nature Reserve. The community representatives of the village of Nenas also recommended that the government regulations of the Nature Reserve be integrated with the local customary law to avoid the sense of independent and potentially antagonistic conservation codes. They also agreed that patrolling against illegal timber cutting was a top priority in the Nature Reserve. At village level, the information on the maps helped local farmers make decisions on how to improve the overall land management and allocate agricultural land more efficiently.

In Kayan Mentarang, East Kalimantan, the maps showed which parts of the forest traditionally used by local communities were inside the boundaries of the conservation area. The overlap of claims could trigger a potential conflict over the rights of local people to continue to exploit forest resources in the National Park the way they had been doing for centuries. However, the participants in the community mapping exercise had the tools (maps) and opportunity (participatory planning on zonation) to provide alternative management solutions for the areas where overlap existed. In most areas (for example in Figure 5), communities recommended that fallow lands, current fields, and gardens be excluded from the National Park. They also agreed that old secondary and primary forest be left inside the park provided that the management of the park be based on *adat* (customary) regulations, and collection activities of economically valuable forest products could continue. In other areas, the people themselves suggested that the park area be extended to include all of their customary territory. In this, they

were motivated by their concern to protect their forest resources threatened by the illegal operations of nearby timber concessions.

FIGURE 5: Original boundary of the National Park and recommendations for revised boundary by the communities in the customary land of Kayan Hilir.



Source: WWF Indonesia

Legend Translation:

Lokasi Desa – Village Location
Batas Taman Nasional – National Park Boundary
Batas Desa – Village Boundary

Batas Negara – National border
sungai – River
Usulan TN oleh WWF – National Park proposed by WWF
Usulan TN oleh – National Park proposed by Community

Hutan pemanfaatan sehari-hari – Daily use forest
Hutan pemanfaatan terbatas – Limited use forest
Hutan pem. bersama tetangga – Forest in shared use with neighboring communities
Hutan rimba – Natural forest
Bekas ladang 1-5 tahun – Fallow fields 1-5 years
Bekas ladang 6-20 tahun – Fallow fields 6-20 years
Bekas ladang 20-50 tahun – Fallow fields 20-50 years
Hutan buah – Fruit forest

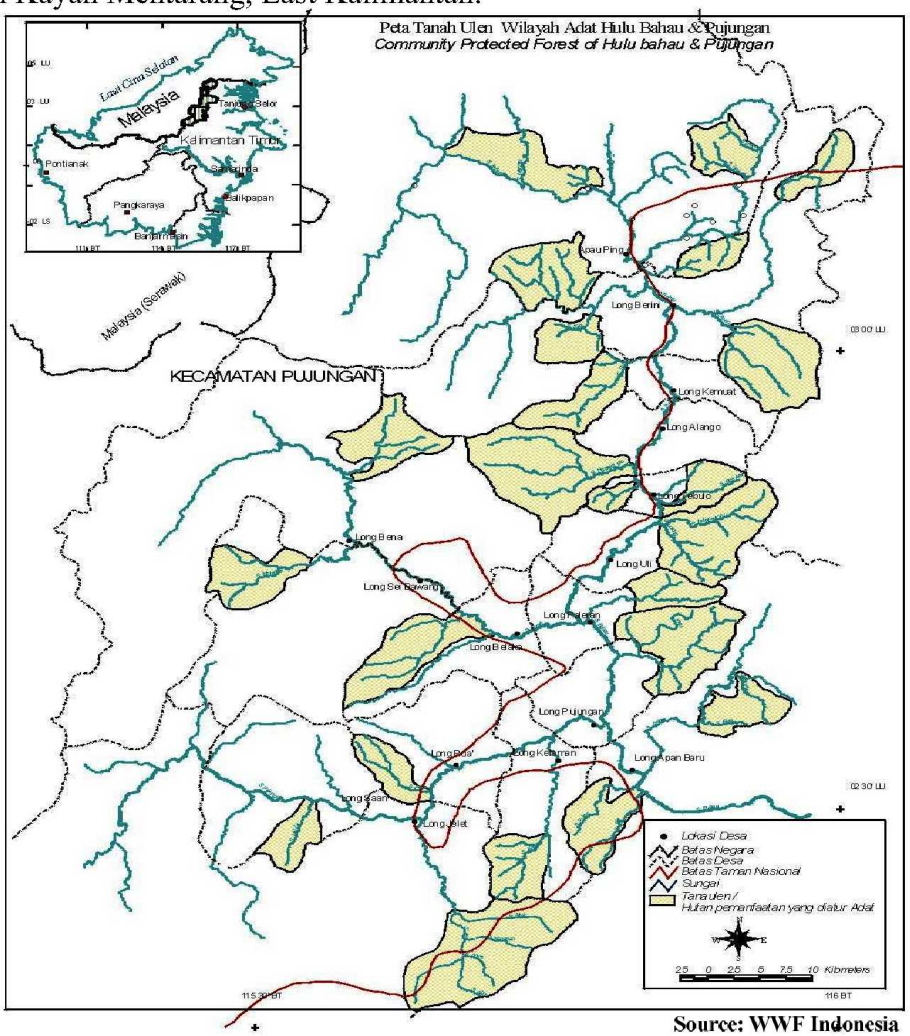
Kebun buah – Fruit garden
Sawah – Rice fields

Bekas sawah – Former rice fields
padang penggembalaan – Fields returned to use
Tana' paye – *Paye* land
Lahan kritis – Critical land

The idea that the co-management of the conservation area could be accomplished by using local models of resource management has been one of the most important results of the community mapping process. The Kayan Mentarang project was able to assess the viability of a traditional resource management system like *tanah ulen* (protected forest) for community-based management of the Kayan Mentarang National Park and its buffer zones (as shown in Figure 6).

Whereas in the past *tanah ulen* was the privilege of the aristocratic class, changes in the local social context since the 1970s pushed for its redefinition as common property where use of resources was regulated by customary law to the advantage of the entire community (Kahang 1998). Ownership and management principles were changed to reflect the new circumstances. The authority was transferred to the customary council *(lembaga adat)*, and its leader *(kepala adat)*. The project will make recommendations in the management plan to acknowledge and retain the status of *tanah ulen* as a possible way to help manage the forest sustainably.

FIGURE 6: Distribution of *Tanah Ulen* protected forest in two communities in Kayan Mentarang, East Kalimantan.



Source: WWF Indonesia

Legend Translation:
Lokasi Desa – Village location
Batas Negara – National Border

Batas Desa – Village Boundary
Batas Taman nasional – National Park Boundary

Sungai - River
Tanah Ulen/ Hutan pemanfaatan yang diatur Adat – Protected forest/forest used according to *adat* rules

In Irian Jaya, community mapping in the highlands produced a landscape and land use zonation plan. It proposed the local model of ecological and use zones based on altitude and contour lines for the park zonation whereby the highest sub-alpine and alpine areas would be designated as core zones, and lower areas would be retained as forest extraction areas in traditional use zones (Mambai et al. 1998).

The cases mentioned above suggest that the effectiveness of community mapping as a tool for better conservation management is contingent on making the objective explicit and clear to all stakeholders beginning in the planning phase. Divorcing conservation management objectives from the implementation of community mapping risks undermining the outcome of mapping and the use of maps as negotiation and mediation tools.

In Kayan Mentarang, for example, the concern with training community representatives and the desire to link it more to the local institutional context signified less attention to the role of community mapping in conservation areas management. One defining aspect of community mapping in a previous phase, i.e., the creation of a village zonation plan for the conservation area, was temporarily dropped for fear that it might interfere with the community mapping process, decrease its true participatory value, and create an unnecessary bias in the way communities discussed their use and management of natural resources. The lack of an explicit goal for community mapping other than the creation of a map by the community was, in Laidlaw's (1996) view, an indication of a more facilitative, empowering, and less manipulative process. However, it also deprived the maps of a significant framework of interpretation. It became unclear to the project and the communities themselves what the maps were for and what was the link with the overall objectives of the WWF conservation project. The failure to communicate more clearly the goal of the mapping activities and the relation with other aspects of the project was only exacerbated by the assumption that conservation awareness and understanding of the importance of a National Park was already high among local people. In the meantime, other economic and political interests had managed to partially alienate the support of some key community members. While, initially, most local people saw the conservation area as a way to secure their rights to the use and exploitation of forest resources, more recently, in some communities, people concluded that the WWF conservation project was trying to appropriate and exploit their land in the same way the timber concessionaires were.

Similarly, unclear or unstated goals linking conservation management of protected areas with community mapping efforts could expose and fuel conflicting priorities between local people and conservation staff in Nusa Tenggara. Community mapping may become a way to legitimize agricultural and pastoral encroachment in conservation areas instead of a way to mitigate those threats by revising boundaries and establishing common conservation measures (Momberg and Van Noord 1998).

3.2 Community mapping, participation, and empowerment of local people

Belief in the advantages of local peoples' participation in planning development has led to the creation of a large number of manuals and methods for facilitating community participation and participatory surveys. According to Peters (1996), participation ideally defines the ability of people to share, influence, or control planning and decision-making in projects which affect their lives and resources. Peters, however, also convincingly maintains that "participation is foremost a political process involving contestation and conflict among people

with different interests and claims rather than a methodology or a set of facilitating techniques" (Peters 1996: 25).

Ideal statements about participation, however, often clash with the practice of participation. The claim that the community mapping approach is "really" participatory is made emphatically. Indicators of participation include the "involvement of local people without exception" (Damus et al. 1996): groups of men, women, and young people who contribute their often diverging views to the mapping process and integrate them in the final, consensus-building meeting of the community *(musyawarah)*; the decision by communities of which resources to map and which symbols and classification to use on the maps; and involvement of all stakeholders in the process.

Some important questions with regard to the level and degree of community participation need to be addressed: Can people who do not know how to read and/or write truly participate in the process of community mapping as it is proposed? Can the gap in education and technical skills be ignored or do they limit full participation, i.e., control and share, on the part of some participants? Examples from Irian Jaya and Nusa Tenggara bring this issue to light when project staff acknowledged that theoretical mapping and GIS training proved too difficult for the participants of the workshop. Moreover, it is unrealistic to expect that one training and community mapping exercise is sufficient for the new trainees to master the techniques and implement them on their own. All three projects will need, in the future, to address the aspect of time, training and equipment costs, and frequency of learning opportunities.

Other questions about participation and empowerment can be raised. Are the three groups (men, women, young people) always the most significant clusters representing the different views within the community? Can a proposal to conduct community mapping initiated by an external agency or NGO ever become a truly participatory process? It is also important to remember that participatory methods and approaches are still to a large extent unusual in Indonesia where central planning and top-down approaches have dominated development and economic strategies for years.

Local participation is not only difficult to define and obtain, it is even harder to sustain beyond the temporal and spatial boundaries of the limited period of community mapping activities. In this regard, the success of a participatory approach needs to be measured in terms of the degree of success on the part of the trainers to raise awareness and self-reliance among community members, and enable them to fully participate in the planning for the management of the conservation area. Can community mapping support institutions among local people effectively defend the rights and interests of local people over the long term? Can it improve the level of organization of local institutions to ensure constant community representation in negotiations with government agencies on issues of conservation management? Can community mapping help strengthen the role of customary law and encourage the recognition of customary law in the community-based management of conservation areas? In regard to this last question, we must also take note of the fact that, in some cases, traditional leaders that were once the guardians of the forest and drew their authority from that stewardship may now legitimize their power on behalf of personal economic interests of exploitation of resources in the protected area.

The following illustrations can help verify to what degree participatory community mapping has raised awareness and supported empowerment among local communities. In Nusa Tenggara, the people in the village of Nenas acquired a new awareness as a result of community mapping and research about traditional regulations. They began to regard *adat* as an adequate tool to enforce conservation and the sustainable management of the protected area.

The growing network of *Kelompok Mitra Pengaman Hutan* (KMPH) - - a partnership for forest protection in several conservation areas in Nusa Tenggara - - need to be seen in the context of the Upland Development Consortium's efforts to create a diverse and inclusive forum to openly discuss issues of conservation and management in Nusa Tenggara. In Lombok, KMPH seeks legal status for fuelwood collection as part of a forest system managed and monitored by the group to ensure sustainability (Momberg and Van Noord 1998). In the village of Wanggameti, Sumba, the first KMPH was formed after the cross-visit by the group from Lombok and it has since become a key partner in WWF activities. While the definitive legal status and related authority of these and other KMPH groups is still debated, their existence is already an indication of stronger awareness and a changed attitude with regard to conservation and environmental issues.

In Irian Jaya, local warfare, the Papuan resistance movement, and conflicts with the nearby gold mining operation of P.T. Freeport Indonesia have promoted a strong sense of tribal land ownership. In this situation, land sales by local people have inevitably triggered social conflict and the erosion of traditional leadership. The representatives of Dani people used community mapping to raise community awareness and thus preclude land sale or prevent sale below market price (Mambai et al. 1998).

In Kayan Mentarang, a workshop evaluated previous community mapping activities in one particular area, Krayan. The WWF team measured the degree of active participation by local people as well as the impact of community mapping activities (Damus et al. 1995). As a result of community mapping, local people felt motivated to revitalize old traditional rules and restricted uses of certain forest areas. They also decided to meet with neighboring villages to discuss joint or shared management of forest land claimed by both communities. According to the participants, the map was a document that could be used to show outside parties the community's important management stakes in the area. The communities also expressed an interest in having WWF help lobby the government for securing their traditional rights.

While the focus has been on capacity building and awareness raising among local people, it is important to note that the effort to involve government agencies has also enabled researchers working on behalf of the government to develop skills and gain experience in mapping and other PRA techniques. In Nusa Tenggara, the inter-disciplinary team of the Conservation Working Group helped government people realize the shortcomings of old, centralized, and top-down planning, and see the potential of PRA for community input into development planning.

3.3 Community mapping and the resolution of boundary conflicts

Participatory mapping can be a powerful tool for boundary delineation of protected areas and resolution of boundary disputes. The process of community mapping imposes a visualization of the land based on lines that demarcate and, more importantly, separate village and customary lands; conservation areas, forest concessions, and traditional forest reserves; areas allocated for

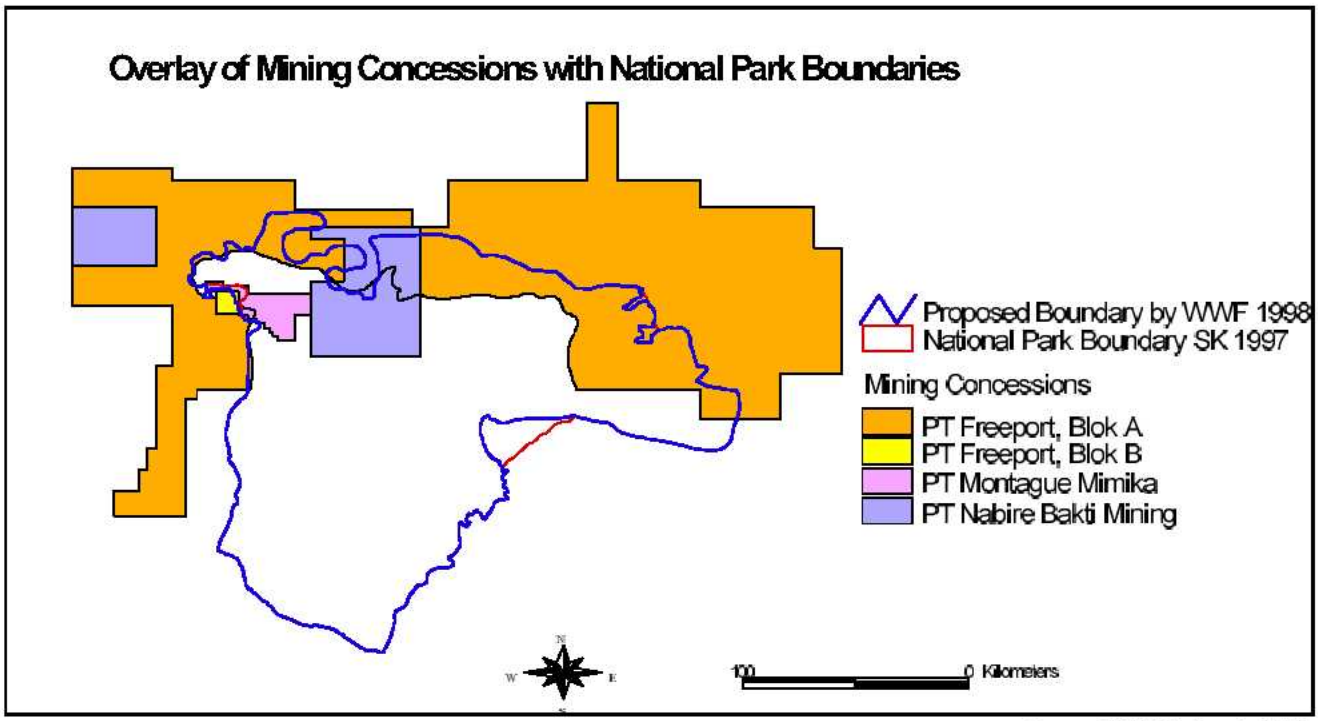
agricultural purposes, fallows, hunting and gathering areas; private and common property. Maps depend on the visual, precise marking of boundaries, and these boundaries cannot by definition reveal fuzziness or uncertainty (Gatmaytan 2000). While rivers and mountains have been used to mark and claim traditional territories, these natural cues are not always used as fixed lines enclosing and separating spaces. Maps may thus convey an inappropriate sense of definitive and permanent micropartition of the land to government officials as well as instill a false sense of tenure security among local people.

In traditional contexts, aural cues, i.e., telling or narrating one's claims may have been just as important as visual cues in acknowledging claims to land and other natural resources. The ability to name places such as mountains and rivers (rather than mark them) is taken as definitive evidence in land disputes. Silence, i.e., the inability to name or narrate one's land, is equal to illegitimate claims. In this regard, the collection of oral history is an important component of community mapping in that it can support claims. This is particularly true in areas with a complex history of land use and control. Multiple and overlapping claims may depend on events like voluntary migration and relocation of "isolated" communities by the government, as happened in parts of the Kayan Mentarang National Park. Confusion on boundaries can also arise as a result of the different and sometimes conflicting purposes of use claims over the same area. For example, in conservation areas in Nusa Tenggara the old boundary drawn by the Dutch is not the same as the boundary designated on paper by the Department of Forestry and, sometimes, later modified by other government agencies. Moreover, the boundary often does not take into consideration local needs and practices of land management (Momberg and Van Noord 1998).

Community mapping sessions in Kayan Mentarang required that villages settle long standing boundary disputes about their territory. Where no agreement could be reached, a viable option was to declare the land a "*tanah pemanfaatan bersama*" or land used together by the two parties. Recently, a meeting was held among customary land chiefs of the Kayan Mentarang National Park to resolve boundary disputes between *wilayah adat* territories. The participants used the maps produced by the communities in collaboration with WWF and edited the boundaries.

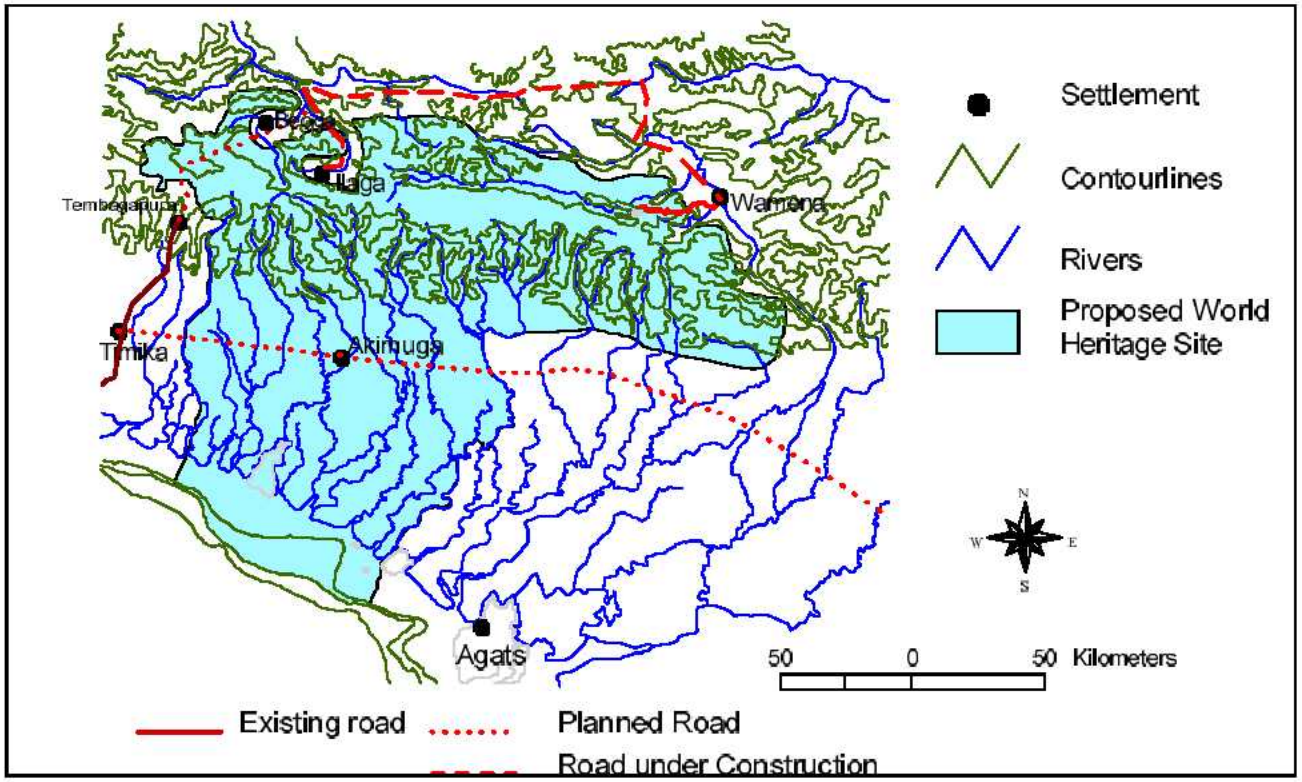
In Irian Jaya, the boundary delineation of the Lorentz National Park is threatened by overlapping mining exploration concessions (Figure 7) and plans to open roads cutting across the park (Figure 8). Overlay of maps with road plans, park boundaries, traditional land use and settlements, rivers and ecosystems were used to advocate for alternatives to environmentally unsound development plans. Some strides were made when the provincial government agreed to cancel the road plan from Merauke to Timika (Mambai et al. 1998).

FIGURE 7: Map of Lorentz National Park, Irian Jaya, showing threats from mining concessions.



Source: WWF Indonesia 1998

FIGURE 8: Existing roads and plans for new roads in the area of Lorentz National Park.



Source: WWF Indonesia 1998

Such a potentially positive use of community mapping can, however, also generate negative reactions in the communities. Community mapping might not bring about new boundary disputes in a community, but local participants might feel they are being forced by the process to discuss and resolve boundary conflicts that they would rather leave unsettled. They might feel pressured to draw clearly defined boundaries to exclude others in order to assert their claims to the land (Gatmaytan 2000). If timing is not right and imposed by outside facilitators, and the socialization process is limited, the situation might provoke a certain degree of resentment on the part of the concerned communities.

4. Unresolved Issues: Diverging Views and Difficult Consensus

Results of community mapping confirm the importance of working together with local communities and government agencies to try to mediate between the views of official authorities and the expectations of community leaders, and between traditional leadership and younger generations. Consensus was, not surprisingly, difficult to create. This, in part, might stem from a basic contradiction built in the community mapping process itself whereby a bottom-up, participatory approach is meant to operate within a social context often characterized by strong hierarchical relations and profound discriminations pitting different ethnic groups against each other and/or the communities of the interior against representatives of the government. It is at the level of decision-making where participation becomes muddled and conflicts may arise. The ability to manage these conflicts by means of a participatory process like community mapping is contingent upon renewed attention to micro-political issues and contextual factors.

In Kayan Mentarang and other WWF projects, the aspect of biodiversity conservation priorities has remained strangely marginal in the discussion of community mapping as a tool for better management of conservation areas. The main limit of the community mapping experience is that maps and models for zonation of conservation areas have so far proceeded with little or no input from biological surveys or other kinds of ecological and biodiversity assessment. If not properly addressed, this issue has the potential to cause a larger divide between community concerns and people-oriented projects on the one side, and biodiversity and biological protection on the other. It can also further alienate support for conservation areas among local people as these priorities are perceived as increasingly separate and opposed.

Community mapping, inasmuch as it is a participatory and empowering tool, can produce an outcome that may be used for purposes other than conservation management. In principle, this is an indication of a successful implementation of the activities and transfer of skills that are now being used on behalf of the emerging and specific interests of the participants. But what if these needs may in the long term conflict with the objectives of the conservation areas? In Kayan Mentarang, the notion of an ancestral land that the community maps helped “prove” poses new challenges to the integrity of the conservation area and a powerful dilemma to its managers. Two groups intend to claim back their customary land inside core areas of the National Park and plan to move back into the area. The extent and degree of this return movement is difficult to determine, but the current period of social and political reform in Indonesia further encourages such initiatives prompted by the rightful claim to have land rights officially acknowledged. Management solutions like enclaves, and access and collection rights by local people in large areas of the Park are currently under examination by the government in order to mediate between nature interests and the needs of the people. However, it is also true that the conservation area would not survive plans for large plantation schemes or logging operations. In the vicinity of the northern part of the Kayan Mentarang National Park, some community leaders are asking WWF to provide digitized maps that they could show as evidence of land rights. This way, they feel they are entitled to ask for higher compensation for allowing illegal logging to continue in the buffer zone of the park. The situation is likely to further increase divisiveness in the communities and jeopardize the sustainable management of the area.

In Irian Jaya, the close collaboration between Bappeda and WWF ensured the acknowledgment of the method of community mapping and acceptance of the maps as part of the land use planning for the province. In the district of Bulungan, East Kalimantan, maps were presented by community representatives to government officials at a meeting organized by the Kayan Mentarang project. The meeting was successful in at least two respects. Officials in key decision-making positions became interested in the process of community mapping. Moreover, they had a chance to learn about local practices of land use and the stakes of the communities in the management of natural resources. Although maps have not been formally acknowledged by the head of the district nor included in the district spatial plan which is still in the making, community representatives still felt that by means of those maps they were able to convey their views on tenure and management rights in customary lands.

To what extent are the above examples a sign of a policy role played by community maps? Is the promising direction in Irian Jaya the result of the interest of a few government officials or an indication of changed mentality and new openness at the government level? One of the challenges of working with government officials in Indonesia is that individuals may be replaced as they are moved to other locations in their developing careers. New bureaucrats may or may not be as supportive and, in most cases, a long period of re-socialization with regard to community mapping and participatory approaches has to start all over again. But the promises of the new period of reform and decentralization might prove the latter concern unwarranted.

5. The Future of Community Mapping: Are Maps Sustainable?

The key criteria for measuring the success of community mapping and assessing its effectiveness as a tool for community-based conservation area management revolve around two main aspects: the information (reliability, quantity, complexity) contained in the maps and the ability of communities to manage the maps.

The enthusiasm for very rapid and participatory methods of assessment currently supported by most international organizations, local NGOs, communities, and governments has both justified and reinforced the use of community mapping in conservation projects. While the method may be adequate to develop a general understanding of the situation and the problems, it might not be sustainable in the long term unless supported and complemented by other methods, long-term research, and monitoring that can unravel local complexities, changes, and trends in resource management (Padoch et al. 1998).

One example may serve as illustration of the danger of "snapshot" maps. In Kayan Mentarang, community mapping and rapid village zonation plans in 1993-1994 produced results substantially different from those of community maps in 1998. There was a wildlife sanctuary in one community that was later denied. Contrary to present claims, people had recommended that entire areas of unique habitats like heath forests and special areas like sacred forests be designated as core zones, i.e., the area of absolute protection and no human activity according to national park management principles in Indonesia. Some *tanah ulen* areas appeared in different sizes and along different rivers. Besides methodological shortcomings, the possible source of these differences may stem from the varying economic and social conditions. These differences may have influenced the priorities and needs of local communities who then produced different information over time. Maps are snapshots in time that need to be updated, extended and expanded by the help of other techniques and exercises. The realization that maps remain limited in their ability to present the complex and dynamic reality of land use, control and management of natural resources might indeed be very important for the future of community mapping.

Will communities be ready to independently manage the process and use the results of community mapping to their benefit after the completion of the WWF projects? Will they be able to monitor changes in their land and enforce sustainable management of resources? Sustainability of the maps depends on the ideal and practical ownership of the maps. The experience of the NGO Yayasan Karya Sosial Pancur Kasih in West Kalimantan shows their impressive success in producing village sketch maps and winning recognition of traditional land use systems within the process of regional spatial planning. Villagers now seek the help of Pancur Kasih to map their land, whereas in the past in the past Pancur Kasih had to convince villagers of the value of community maps. In Kayan Mentarang, community maps are still perceived as WWF maps. This is related to the fact that the community mapping process was started "suddenly" following the needs and urgency of the WWF project, and then implemented after a brief period of socialization. Recently, however, requests for training and implementation of community maps are submitted from villages outside and away from the park where land conflicts (such as oil palm plantations) are most pressing. Intellectual property rights on community maps should also be more clearly defined between the communities and WWF Indonesia. Only insofar as these are "their" maps, can communities use them to effectively deal with their priorities in management and development.

Maps should not be considered final products but tools to regulate land use and find appropriate management solutions. Initiatives such as the formation of local map committees, and the involvement of government officials in the process are a good start. These initiatives, however, need to be further integrated in a common strategy for a broad recognition of customary land and management rights in conservation areas. The usefulness of community mapping as a tool for community-based conservation area management is ultimately contingent upon the establishment of a clear and fair government policy for guaranteeing local rights and for endorsing communities' equal role in the management of conservation areas.

APPENDIXES

Background notes on conservation areas discussed in the paper

Appendix A:
Kayan Mentarang National Park, East Kalimantan

The Kayan Mentarang Conservation project began in 1990 as a collaborative effort by the WWF-Indonesia Programme, the Department of Forestry, and the Indonesian Institute of Sciences (LIPI). Its long-term goal was the establishment of conservation management integrated with sustainable economic development in the Kayan Mentarang National Park and surrounding areas.

With its 1.4 million ha, the Kayan Mentarang conservation area in the far interior of East Kalimantan is the largest protected area of rainforest in Borneo and one of the largest in Southeast Asia. The park encompasses the territories, or parts thereof, of five sub-districts in the Bulungan Regency, East Kalimantan: Kayan Hilir, Pujungan, Krayan, Mentarang and Lumbis. Besides the divisions imposed by administrative boundaries, the park conceals a variety of natural and cultural habitats that reflect the diversity of its ecosystems and the legacy of Dayak people who have inhabited this area for centuries. It is precisely the interconnection of nature and history that makes the Kayan Mentarang National Park a rich site and a priority in natural and cultural preservation.

Primary mixed dipterocarp forests of mainly *Shorea* spp. dominate about half the reserve which lies below 1,000 m, while at higher altitude plants of the *Fagaceae* family dominate. Moss forests rich in ferns grow on upper mountain slopes and the highest tops of sandstone hills that reach the highest elevation of 2,500m. Although surveys for the assessment of biodiversity have been undertaken in just a few pilot areas, preliminary explorations show the high biodiversity and species composition of the forest.

Extensive archaeological remains in the reserve are evidence that the area has been inhabited for centuries. Today, about 20,000 Dayak people live in or near the reserve, including the Punan, Kenyah, Kayan, Saben, and Lun Dayeh. Except for the people to the north of the reserve who are mainly wet-rice farmers (the Lun Dayeh), the Kenyah, Kayan, and Saben people are swidden cultivators of rice. They also all depend on hunting and fishing to fulfill their subsistence needs, and collect forest products for commercial trade. These communities are still largely regulated by customary (*adat*) law with regard to the management and tenure of forest and other natural resources. Since the early 1990s, *gaharu* exploitation has experienced a boom and hundreds of outside collectors have reached the park area and indiscriminately cut *gaharu* trees. Similarly, langurs have been killed in increasingly higher numbers by collectors of bezoar stones. Firearms and poisoning of salt springs are among the techniques used.

In 1996, the Kayan Mentarang project successfully secured funding from DANIDA (the Development Agency of the Danish Government) for a new phase (1996-1999). The immediate objective of the project is to design a protected area and buffer zone management plan for the Kayan Mentarang National Park in collaboration with local communities, and local and national government. In doing this, the project aims to develop a management system for protecting the biological and cultural resources of the park which draws on traditional management strategies. Particular attention is being paid to the aspect of regulating collection of forest products and ensure local rights of access and exploitation over natural resources.

Further information about the Kayan Mentarang Project can be found in Whiting and Paru (1999) and Sorenson and Morris (1997).

Appendix B:
Conservation areas in Nusa Tenggara

Nusa Tenggara (the Lesser Sunda Islands) is a chain of over 500 islands which extends from Lombok to Timor in south eastern Indonesia. Around 108 conservation areas have been established to protect biodiversity and the high bird endemism across the three provinces of Nusa Tenggara, but only a few of these are actively managed. Most of the original forest has been degraded by human activity into open savannah woodlands or agricultural land. Firewood is the most important forest product for local communities. The most valuable commercial product, sandalwood, is controlled by a state monopoly. Local farmers are interested in converting forest lands into agricultural lands.

The Mount Rinjani forest complex in Lombok is an extended volcanic massif of highland forests. Despite its status as a protected forest since 1929 and game reserve since the 1941, logging, uncontrolled fires, and agricultural encroachment have caused a dramatic reduction of the original forest coverage. A reforestation program with mahogany trees was started in the village of Sesaot. Local people were given temporary rights to plant and harvest coffee in the commercial plantation but were denied the right to collect firewood.

The inventory of agricultural land and the geocoding of old Dutch boundary pillars and fruit trees in the conservation areas remains a priority for rationalizing boundary delineation and management of buffer zones.

The 12,000 hectares of the Mt. Mutis Nature Reserve include unique montane forest dominated by homogeneous stands of “ampupu” or *Eucalyptus urophylla*. The forested slopes of Mutis are a critical watershed for the island of Timor and play a strong role in the economy and culture of fourteen villages located in and around the reserve.

Livelihood strategies of local people center around farming and livestock rearing. Farming systems are based on a complex system of dry-land crop rotation. Crops grown for household consumption include: tubers, corn, and dry rice. They grow cash crops such as garlic, white and green onions, and herbs, as well as fruit trees. They raise cattle and horses, which are allowed to graze and range freely within the forest. The forest is also important as a water supply and a source of building materials, fuelwood, honey and sandalwood. Interactions between the people and the environment have long been regulated by *adat*. Traditionally, forest land was divided into a network of *sufs* (areas of usage) overseen by customary chiefs. Strict regulations and a system of fines were imposed. The customary system of natural resource management has largely been credited with conserving the primary forest in Mutis, but it is unclear whether its efficacy will survive the pressures of social change and economic development.

Several problems have impeded effective management of the reserve: high-density of free-ranging cattle within the forest, lack of clarity over the boundaries of the reserve, and confusion over its classification. The lack of clarity over the location of the reserve boundaries stems from the fact that the decree made in 1983 establishing the Nature Reserve was not followed by ground-truthing and placement of concrete pillars as markers. Boundary markers are not visible in the field, and villagers claim that the boundaries visible on the map have infringed on agricultural and village land.

WWF has worked closely with the Department of Nature Conservation Sub-Balai KSDA to design a long-term management strategy for Mutis that balances the integrity of the reserve's ecology with sustainable use by adjacent communities. One of the priorities is to clarify the boundaries between land belonging to the village and that included in the reserve.

The information above is based on Lentz et al. (1997) and Momberg and Van Noord (1998).

APPENDIX C:

Lorentz National Park, Irian Jaya (Papua)[1]

Within the Lorentz National Park, recently declared a World Heritage Site by UNESCO, there are two major ecological areas and community resource management systems: the swamp forest of the lowlands and the highlands of the Sudirman Mountain range including the snow-capped highest peak of Puncak Jaya. The swamp forest of the lowlands extends from the shores of the Arafura Sea to the plains at the foothills of the Sudirman Range in the central part of the island. Asmat and Mimika people have traditionally inhabited this area and harvested sago from the fresh-water swamps, planted vegetables, fished and hunted for a living. For the Asmat people, the sago palm is also the important source of a ceremonial food, the larvae of the Capricorn beetle.

The Central highlands is primarily inhabited by Nduga, Dani, Amungme, and Hupla people, who for the most part cultivate rotational gardens of sweet potato and taro, raise pigs, and collect game and Pandanus nuts in the forest. They inhabit and cultivate lower montane areas where they have also developed a unique form of highland silviculture for managing *Pandanus julianetti*. Upper montane areas (2,000-3,000m) are mainly used for hunting and gathering while upper alpine regions are considered sacred and rarely used. The groups inhabiting the park have strong ties with their ancestral land.

The threats to the integrity of the park and its biodiversity are several. Mining concessions (e.g., P.T. Freeport Indonesia) operate in the vicinity of the park and part of an exploration concession is currently within the park area. Road construction is currently under way inside the northern boundary of the park and close to extremely sensitive habitat of Lake Habbema. Another road is planned that would cut the park in half. Logging concessions are operating on the eastern border of the park and have already caused social conflicts with local Asmat communities.

The information above is based on Mambai et al. 1998. Further information about BSP-supported mapping work at Lorentz National Park can be found by visiting *www.BSPonline.org* and *www.bsp-KEMALA.or.id*.

[1] The province of Irian Jaya was officially renamed Papua in 1999.

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E-mail: rainforestuk@rainforestuk.com; http://www.rainforestfoundationuk.org

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UNITED STATES BUREAU OF INDIAN AFFAIRS *has set up a program, Indian Integrated Resource Information Program, to support the introduction of GIS to Native American resource groups*. United States Department of Interior, Bureau of Indian Affairs, Geographic Data Service Center, 3000 Youngfield Street, Suite 230, Lakewood, CO 80215, USA; Tel: 1-303-231-5100; Fax: 1-303-231-5122; E-mail: gdsc@gdsc.bia.gov; http://www.gdsc.bia.gov/default.htm

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About The Author

Since receiving a Ph.D. in Anthropology in 1995, Cristina Eghenter has been involved with the WWF-Indonesia Kayan Mentarang conservation and development project in East Kalimantan, Indonesia. As Director of the Community Development Program, Dr. Eghenter designed and coordinated activities in support of community-based management for the Kayan Mentarang National Park, including community mapping, participatory planning for the management of the park, training of community representatives and project staff, advocacy of indigenous rights in the conservation area, and design and implementation of PRA techniques for analysis of economic potential and local institutions.

Previously, Dr. Eghenter was the Field Director of WWF's Culture and Conservation Project. This interdisciplinary research program on the cultural dimensions of forest management is sponsored by the Ford Foundation and linked to the WWF-Indonesia Kayan Mentarang project in East Kalimantan, Indonesia (Eghenter and Sellato 1999). Dr. Eghenter has been affiliated as post-doctoral ESF Fellow and currently as Tun Jugah Research Fellow with the Center for South-East Asian Studies, University of Hull, U.K. This opportunity has allowed her to continue writing and publishing on management and conservation, migration, indigenous knowledge, and methodological issues. Dr. Eghenter is also a member of the Advisory Board of the Center for Social Forestry at Mulawarman University in East Kalimantan, Indonesia.